

## CHAPTER SIX

### THE SUCCESS OF THE KING'S FUND BED

*Design turns ideas about the world and social relations into the form of physical objects.<sup>1</sup>*

#### Introduction

Once considered radical, the above assertion is now almost prosaic. In much historical and cultural analysis of design and technology there is general agreement that artefacts embody ideas about the world. The task is demonstrating how. In this concluding chapter I will pursue the question of how the design specification for, and early built forms of, the King's Fund Bed embodied ideas about the changing worlds of hospital medicine and professional design in the 1960's. In both spheres, long- standing social relations, and practice, were altering rapidly. I shall argue that the success of the King's Fund Bed, in terms of its widespread appearance in British hospitals by 1975, was very closely related to how successfully it embodied some of these ideas. The bed was indeed a success for Archer's method, but possibly for reasons beyond systematic design's own criteria of satisfying the conflicting user needs identified in the method; that is unless the notion of need is problematised.

#### Expertise

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<sup>1</sup>A. Forty, *Objects of Desire*, Thames and Hudson, 1979, p.245, (1986 edn.)

In the design world of the 1960's, science provided a powerful rhetoric. It was useful internally, in challenging traditional hierarchies such as that still prevailing in Britain in 1959 of 'fine artists first, craftspeople second, communications designers third and industrial designers a poor fourth'.<sup>2</sup> And those who were able to use the new rhetoric had a powerful new mandate for the design profession as a whole. When directed externally, an alliance with science brought advantages, as so many professional groups discovered in the post war years; theoretical justification, certainly, but also contracts.<sup>3</sup> Bonsieppe's solid, serviceable sort of person who rationalised decision making and optimised design solutions, 'just what an industrial system needs', again comes to mind. Bonsieppe, an astute internal critic at Ulm, commented in 1967 that 'the word "science" . . . still performs an essentially suasive function in the process of consolidating the social status of the designer'.<sup>4</sup> Nearer home, hearing Janet Daley's fierce criticisms of Design Methods in the late 1960's, Broadbent wrote that 'perhaps she underestimates . . . the desperate need that many environmental designers have to be recognized as "respectable" by science' (this was at the Conference on Design Methods in Architecture).<sup>5</sup>

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<sup>2</sup>Frayling, *The Royal College of Art*, p.147, quoting Misha Black.

<sup>3</sup>As methodological pluralism grew in sociology, for example, in the 1970's, practitioners were aware of the commercial disadvantages that a retreat from scientific methods would bring. 'Anarchy is difficult to sell, and . . . a lot of sociology is being bought and sold in the market place . . . A loss of confidence in positivism (would) almost certainly make consultancies harder to obtain, make sociology less demonstrably useful.' C. Bell and H. Newby, 'The rise of methodological pluralism', in C. Bell and H. Newby (eds), *Doing Sociological Research*, London, George Allen and Unwin, 1977, pp.17-30.

<sup>4</sup>Quoted in Lindinger (ed), *Ulm Design*, p.111.

<sup>5</sup>G. Broadbent, 'Design method in architecture', in Broadbent and Ward (eds), *Design Methods in Architecture*, pp.15-21:18.

If science provided a powerful rhetoric, abstraction provided a powerful tool. The abstraction of design problems to numbers, to diagrams, to generalised schedules and checklists promised a superordinate and universally applicable method which, by incorporating 'expert opinion', in suitably codified fashion, potentially did away with the need for it in any particular instance. Kenneth Agnew's description of a hospital equipment designer as a 'sort of boiled down and concentrated hospital staff' is apposite here.<sup>6</sup> Furthermore, the process would be self-generating. It was pointed out by Archer and others that the use of operational research type methods in planning new hospitals in itself meant that there would be a need for expert opinion on equipment and other design issues long before any medical or nursing staff were appointed.<sup>7</sup> Other advantages were not lost on the MOH. Operational research-derived techniques such as network analysis could be used to sort out some of the complications of the planning process and also, incidentally, to demonstrate to medical consultants and local committees when they made suggestions for changes in the plans, what the cost of changing the project at that stage might be.<sup>8</sup>

The movement of power away from long-standing traditional locations within the professions, where it had resided at least since the beginning of the twentieth century, has come to be identified as a fundamental part of the growth of managerialism. For some designers, this trend pointed the

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<sup>6</sup>AAD/1989/9, Job 30, Kenneth Agnew, lecture to Castors conference, 9.5.68.

<sup>7</sup>AAD/1989/9, Job 1, Working Document 8, 13.10.61.

<sup>8</sup>E.L. Wallace of the MOH, addressing Work Study Officers on 'the thoughts that the Ministry had had on the matter'. Anon., 'Network Analysis in the Hospital Service', *British Health and Social Service Journal*, November 20th 1964, pp.1674-1675:1674.

way to a vastly expanded role. Others were not so sure. Misha Black, Archer's professor at the RCA during the bed project, was at pains to point out frequently during the 1960's and early 1970's that design and management were different activities; designers were indispensable to managers of course, but different. The designer was the:  
 . . . irritant in the oyster . . . he might well be the odd man out in tidy industrial hierarchy. Professional competence alone was insufficient  
 . . . visionary capacity subsumed his practical everyday competency  
 . . . the essential quality of design is creativity<sup>9</sup>

Design, as a profession, was a more precarious, and recent, activity than medicine. Leading exponents such as Black saw the need to defend an intrinsic expertise, often described as residing in the 'creative' aspects of a designer's work, against the threat posed by managerialism; something 'anyone' could do.

Notwithstanding Black's concerns, the designer/manager was a useful individual to other managers, similarly engaged in replacing expert opinion with a superordinate expertise and its operational consequences of centralisation, clear organizational structure, and standardisation. In few places in British institutional life were these power struggles more clearly played out than in the NHS, and in particular in the large organisational units of the Service, the hospitals. Slowly but surely, the King's Fund Bed made its way through the various factions, its protagonists sometimes anticipating opposition from the traditionally powerful which did not materialise, sometimes, as outsiders, getting the power relations wrong. The Bed's protagonists overestimated some (such as nurses) and

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<sup>9</sup>Misha Black, 'The Designer and the Manager', Tiffany Lecture Series on Corporate Design and Management, 24.10.73, audiotape, AAD/1980/3.

underestimated others (such as the King's Fund) but for much of the time they were guided by those greater managers, the civil servants, with whose interests the project largely coincided.<sup>10</sup> I shall now proceed to put some flesh on the bones of this argument, revisiting many of the episodes described in the previous chapters.

The privileged status of science, and scientific method as a way of acquiring knowledge about the world, was an overriding presupposition in Archer's method.<sup>11</sup> His scientism was pervasive. As noted in Chapter Two, it underlay not only the methods he advocated for the design process, but also his preferred accounting for what others might regard as social or cultural phenomena. Creativity, for example, was discussed in terms of randomness and chaos theory.<sup>12</sup> In psychology, he was interested in the 'personal construct theory' of George Kelly and considered employing it in eliciting user needs.<sup>13</sup> This is at first sight surprising, given that Kelly is credited with abandoning an objective, behaviourist approach to

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<sup>10</sup>For a study of these issues in the English Civil Service during the inter-war period see Gail Savage, *The Social Construction of Expertise: The English Civil Service and Its Influence, 1919-1939*, Pittsburgh, University of Pittsburgh Press, 1996.

<sup>11</sup>What constitutes scientific method is of course open to interpretation. Archer cited, among others, Russell Ackoff, whose book on scientific method was prompted by the operational researcher's problem of how to apply it in unfamiliar spheres. Ackoff adhered to an orthodox, positivist account, but was careful to point out that 'science itself was a phenomenon that may be looked at in many different ways'. Russell Ackoff, *Scientific Method: optimising applied research decisions*, New York, John Wiley and Sons, 1962, p.vii.

<sup>12</sup>Other authors in the 1960's and 70's found in elements of the 'new physics' a potential explanation for human qualities such as creativity. See, for example, Michael Talbot, *Mysticism and the New Physics*, London, Routledge and Kegan Paul, 1981. (Apparently written circa 1970.)

<sup>13</sup>G. Kelly, *The psychology of personal construct*, New York, Norton, 1955. Kelly was one of a number of psychologists, including Leon Festinger, Fritz Heider and H.H. Kelley, who established the study of interpersonal relationships on a cognitive rather than a behaviourist footing. Smith, *History of the Human Sciences*, p.777.

interpersonal relationships and substituting a concern with cognition, attributing behaviour to thought and expectation rather than motive and need. Since Archer did not hesitate to use the latter concepts in much of his published work it was perhaps more likely that the attraction of personal construct theory lay in its key model of everyday human interaction, which Kelly regarded as being 'identical to the process of science'. Like much cognitive psychology, it was equally insistent in its striving for objectivity. It is not difficult to see the attraction of this for Archer, nor why, in later writing, he cited Karl Popper as the spiritual father of Design Research, (operational research was its mother).<sup>14</sup> He considered that the impact of Popper's *Conjectures and Refutations*, published in 1963, 'was immense. Conjecture, exploration and refutation (or, more popularly, proposition, development and test) is exactly what designers do! Design activity was scientifically respectable!'<sup>15</sup>

But in the 1960's it was a rejection of scientism which underlay much of the criticism of systematic methods such as Archer's which came from the design professions themselves. Some practitioners, like Black, feared the reduction of 'creativity' to science. Archer recalled that greatest opposition within the RCA came from the departments of fashion and graphics; both fields where individual creativity had a high premium.<sup>16</sup> And for many designers in commercial practice, everyday realities meant such methods appeared irrelevant, or beyond their resources 'when they had a

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<sup>14</sup> Bruce Archer, 'Design, innovation, agility', *Design Studies*, 20, 1999, pp.565-571:567. The term 'Design Research', was preferred to 'Design Methods' from around 1980. Much of the content was similar.

<sup>15</sup> Ibid, p.567. Many participants in the Design Methods debates had recourse to the philosophy of science. Popper, Kuhn, and (much less frequently) Polanyi, were the most cited authors.

<sup>16</sup> Bruce Archer, Interview, 10.5.99.

deadline for tomorrow'. But in academic circles, theoretical criticisms were made explicit. The proceedings of the British conferences on Design Methods held during the 1960's chart a change from advocates of new and apparently helpful techniques addressing generally receptive audiences with similar outlooks, to intense debates where proponents of scientistic approaches might be subjected to 'onslaughts' and 'the severest of philosophical criticisms of their work'.<sup>17</sup> (The general rejection of Design Methods that came in the 1970's, its partial 'saving' by the creation of 'second' and 'third generation' methods, the contribution of the movement to computer aided design techniques, and its rebirth in the form of 'Design Research', where it is apparently 'alive and well', need not be pursued here to any extent.<sup>18</sup> It might be noted that in an almost exactly analogous process, second, third and even fourth generation methods have been devised in evaluation, another area where the role of scientistic methods has been hotly debated.<sup>19</sup>)

During the 1960's conferences and ensuing debates, Archer's assertions about design came under scrutiny. Some commentators were impressed. His model of the design process 'as an assemblage of OR

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<sup>17</sup> Proceedings of the first conference are in Jones and Thornley (eds), *Conference on Design Methods*, 1962. (Archer was on the organizing Committee) and of the third in Broadbent and Ward (eds), *Design Methods in Architecture*, London, Lund Humphries, 1969. See Broadbent, 'Design method in architecture' in this volume p.17-21, for an account of Daley's 'devastating attack' on behaviourist views.

<sup>18</sup> For a summary of these changes see Cross, *Developments in Design Methodology*, pp.303-308.

<sup>19</sup> Egon Guba and Yvonna Lincoln, *Fourth Generation Evaluation*, Newbury Park, Sage Publications, 1989. See Ghislaine Lawrence, 'Rats, Street Gangs and Culture: Evaluation in Museums' in G. Kavanagh (ed), *Museum Languages: Objects and Texts*, Leicester, Leicester University Press, 1991, pp.9-32, for an exploration of these debates in the museum context.

techniques . . . was enormously sophisticated'.<sup>20</sup> Others suggested there might be alternatives to his view of a house as 'built to keep in a consistent climate and to keep out predators', rather than, say, as a sacred space, or said of his assertion that 'We grow, gather and eat food to keep our metabolism on an even keel', 'even primitive man does much more than that'.<sup>21</sup> Gradually a coherent critique emerged of 'first generation' design methods such as Archer's and Alexander's, which focused on several issues but in particular their behaviourist assumptions. It was this issue which formed the basis of one of the earliest and most cogent attacks. The philosopher Janet Daley delivered a paper at the 1967 Design Methods conference which in her view demolished many of the arguments of speakers who came from engineering or science backgrounds and were less well versed in philosophy.<sup>22</sup>

Some of these speakers' assertions could indeed have come from a neo-behaviourist tract of the 1940's. 'The chief difficulty in building for human needs', said one 'is that the *needs* themselves cannot be observed. We *can* see people's behaviour'. Behaviour was 'a system of operationally defined needs . . . within a given environment'.<sup>23</sup> That behaviour was the empirical counterpart of need was a fundamental tenet of behaviourists.<sup>24</sup>

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<sup>20</sup>G. Broadbent, 'Design Method in Architecture', in Broadbent and Ward (eds), *Design Methods in Architecture*, pp.15-21:15.

<sup>21</sup>Amos Rapoport, 'Facts and Models' in Broadbent and Ward (eds), *Design Methods in Architecture*, pp.136-146:143.

<sup>22</sup>Janet Daley, 'A philosophical critique of behaviourism in architectural design', in Broadbent and Ward (eds), *Design Methods in Architecture*, pp.71-75. Daley expanded this critique in 1982 in 'Design Creativity and the Understanding of Objects', reprinted in Cross (eds), *Developments in Design Methodology*, 1984, pp.291-302.

<sup>23</sup>G. Broadbent, 'Design Method in Architecture', in Broadbent and Ward, *Design Methods in Architecture*, pp.15-21:18, paraphrasing another contributor, Studer.

<sup>24</sup>For what has been constant and what has not in 'behaviourism' as variously defined, see



Critics however considered that design methods which overemphasised what was 'measurable in the physical sense, computable and otherwise supported by "objective" evidence' neglected what was variously described as 'the humanness of human affairs', 'values', and 'emotion or judgement'.<sup>25</sup>

This criticism of behaviourist operationalism was to recur in widely disparate fields in the 1960's. For whereas behaviourism had been, for much of the twentieth century, a school of thought in psychology, by the 1960's it provided a theoretical underpinning for rather more extensive enterprises, principally 'biological psychology' or 'sociobiology', neuroscience and cognitive science. Like behaviourism, all three were associated with claims to have established objective science in their field, and also with claims to a unified science; science that joined the physical and human sciences and, within the human sciences, united psychology and sociology into 'a single field'.<sup>26</sup> Biological psychology was the recipient of massive funding by United States foundations in the 1950's and the basis of the Behavioural Sciences Programme funded by the Ford Foundation from 1952, which took as its goal 'an ideal unification of psychology and the social sciences', thereby creating a science applicable to public affairs. This, and related programmes, have been well documented by historians, highlighting as they do the central relevance of

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Peter Senn, 'What is "behavioural science?"(sic)- notes toward a history', *Journal of the History of Behavioral Sciences*, **2**, 1966, pp.105-122 paper. For a more recent perspective see chapters 2 and 3 of Bernard Baars, *The Cognitive Revolution in Psychology*, New York, The Guilford Press, 1986.

<sup>25</sup>G. Broadbent, 'Design Method in Architecture' in Broadbent and Ward (eds), *Design Methods in Architecture*, pp.15-21:18.

<sup>26</sup>Smith, *History of the Human Sciences*, p.801.

the war-time and post-war contexts, and of military and corporate sponsorship, to the trajectory of the behavioural sciences. Steve Heims account of the Cybernetics Group, subtitled 'Constructing a Social Science for Postwar America', is based around the ten conferences sponsored by the Macy Foundation from 1946-53, and these conferences also have a central place in Donna Haraway's account of the creation of the sociobiological synthesis of the 1970's.<sup>27</sup> Other historians have focused on the RAND Corporation's sponsorship of social science, supported by the U.S. Air Force and entailing much work on game theory, simulation and other techniques derived from operational research.<sup>28</sup>

Archer's published work drew heavily on concepts and analogies current in these fields. His early thinking was also, by his own account, 'dominated by systems analysis'.<sup>29</sup> General systems theory, the attempt to construct an objective science of everything, was of considerable interest to those who looked for unified sciences.<sup>30</sup> Although systems theory became very closely associated with science and, especially, engineering, it had originally attracted practitioners from very disparate disciplines. In Britain, the Institute for the Comparative Study of History, Philosophy and the Sciences was founded in 1946.<sup>31</sup> It began publishing its journal,

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<sup>27</sup> Heims, *The Cybernetics Group*, 1991, Haraway, 'The High Cost of Information Technology', 1981-2.

<sup>28</sup> See Mirowski, 'Cyborg Agonistes', 1999, for example.

<sup>29</sup> Archer, 'Design, innovation, agility', p.567.

<sup>30</sup> Pickering divides the cyborg sciences into those dealing with complex systems, and those dealing with the mind. The systems sciences were 'ontologically promiscuous. Rather than respecting the traditional boundary between the human and the nonhuman, one could do the systems science of humans, of nonhumans or of assemblages of humans and nonhumans.' Pickering, *Units of Analysis*, p.3.

<sup>31</sup> Editorial, 'The Aims of the Journal', *Systematics*, 1, no 1, 1963, p.1.

*Systematics*, in 1963, following 'the discovery that systems have characteristics so completely universal as to make possible a synthesis of our appreciation of the three great fields of human enquiry: Man, the Universe and God.'<sup>32</sup> Volume One contained papers on, among other subjects, religion in the ancient Americas, the phenomenology of perception, theoretical physics, chess playing machines, the relation of geophysics to 'Plato's Atlantis and the Exodus', psychical research and the control of industrial engineering plant.

In the United States, the Society for the Advancement of General System Theory was organised under a section of the American Society for the Advancement of Science in 1954. Its prime instigator was the biologist polymath, Ludwig von Bertalanffy. Bertalanffy published 'An Outline of General System Theory' in the *British Journal for the Philosophy of Science* in 1950.<sup>33</sup> Although these British and American groups 'started from widely differing premises', by 1963 they had, according to the first editorial in *Systematics* 'converged to a point where interchange (could) be fruitful'. Early forms of systems theory had attracted holists such as Gregory Bateson and Margaret Mead, both of whom also attended Macy conferences.<sup>34</sup> But in later forms, such as that propounded by the now Toronto-based scholar, Anatol Rapoport, the field was dominated by more utilitarian concerns. Rapoport was an influential exponent of both a logical and mathematical basis for systems theory and its practical application. Systems theory became increasingly attractive to engineers and

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<sup>32</sup>Ibid.

<sup>33</sup>L. von Bertalanffy, 'An Outline of General System Theory', *British Journal for the Philosophy of Science*, 1, August 1950, pp.165-171.

<sup>34</sup>Heims, *The Cybernetics Group*, p.24.

management theorists as its original holistic and organismic character dwindled in favour of operationalised knowledge based on objective science, as expounded by Rapoport. In one important respect this holistic character was retained. This was in the functionalism which informed all the cyborg sciences of systems and their efforts to produce science which would usefully contribute to human policy making, or perhaps even control it.<sup>35</sup>

Another prominent facet of systems theory as developed by Rapoport was its operationalism. Operationalism had gone hand in hand with behaviourism for much of the latter's existence, given the behaviourists problem of what it was they were actually measuring<sup>36</sup> Rapoport's operationalism was concerned, not with the elucidation of 'new' knowledge under the classical controlled conditions of scientific experiment, where the number of variables was reduced to a minimum, but with the determining of mathematical algorithms that could be applied to the uncontrolled social world where the number of variables was, in principle, infinite. In what he referred to as 'practical science', Rapoport sought ways of matching up the two worlds 'nearly enough', as a means of operationalising the abstract and generalised knowledge he sought to apply. A central strategy involved invoking the classical theory of heuristics. (Heuristics subsequently became of enough interest to management scientists to warrant its own journal of the same name). Archer made use

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<sup>35</sup> Stafford Beer is a British proponent of the cyborg sciences who 'has applied cybernetic reasoning to industrial processes and socioeconomic systems and tested them when he assisted Salvador Allende's government in Chile in managing the social and economic organisation of the country' according to Heims, *The Cybernetics Group*, p.283.

<sup>36</sup> See 'Operationism in Psychology: A discussion of contextual antecedents and an historical Interpretation of its Longevity', *Journal of the History of the Behavioural Sciences*, 25, April 1989, pp.139-153.

of the concept, citing not Rapoport but a book entitled *How to Solve It*, first published by the Stanford-based mathematician G. Polya in 1946.<sup>37</sup> Subtitled 'a new aspect of mathematical method' the book was an attempt to revive the 'ancient study of heuristics' in a modern and modest form'. 'Heuristic reasoning', asserted the author, 'is reasoning not regarded as final and strict but as provisional and plausible only, whose purpose is to discover the solution of the present problem'. It was often based on induction, and on analogy.<sup>38</sup>

Although Archer did not cite Rapoport it seems likely that his systems theory informed key elements of his design method. During Archer's year at Ulm, Rapoport's ideas had been much discussed. Archer did however cite Herbert Simon, the 'theorist of groups and organizations' who went on to become involved in computer simulations of the human brain. In *Models of Man, mathematical essays on rational human behaviour in a social setting*, which Simon published in 1957, he developed an alternative to the concept of rational man, used in classical economic theory and in earlier forms of decision theory, who was required to have: . . . powers of prescience and capacities for computation resembling those we usually attribute to God. When we take seriously the limits of human capacity for calculation, we are led . . . to a significantly different view of rationality; and we begin to see how the rational and the non-rational are compounded in administrative man'.<sup>39</sup>

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<sup>37</sup> G. Polya, *How to Solve It*, Princeton, Princeton University Press, 1945, (2nd edn. 1957).

<sup>38</sup> Ibid, pp.112-113. Polya acknowledged, among others, the gestalt psychologist Wolfgang Kohler and the originator of pragmatism, William James, as influential to his thinking.

<sup>39</sup> Herbert Simon, *Models of Man: mathematical essays on rational human behaviour in a social setting*, New York, John Wiley and Sons, 1957, p.72.

This concept of 'bounded rationality', which he was careful to distinguish from 'irrationality', led Simon to focus on ways of simplifying the choice problem in decision theory to bring it within the powers of human computation. The key to this process was the replacement of:  
 . . . the goal of *maximising* with the goal of *satisficing*, of finding a course of action that is "good enough" (his italics) . . . it will be seen that an organism that satisfices has no need of estimates of joint probability distributions, or of complete and consistent preference orderings of all possible alternatives of action.<sup>40</sup>

Archer made explicit use of Simon's concepts and terminology in his systematic design method, and was later to remark that it was only after 1960, and the publication of works by 'people such as Herbert Simon', that 'it was generally accepted that systems analysis was not so much an explanatory theory as a useful methodology'.<sup>41</sup>

This is a pertinent comment. I have alluded to the likely theoretical antecedents of Archer's ideas on design in the 1960's at some length precisely because the progressive operationalisation of knowledge which many of them entailed served to distance theory from method. This resulted in his, and many other's methods being presented as useful techniques devoid of theoretical origins or assumptions. This was compounded by a tendency to cite secondary sources and textbooks,

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<sup>40</sup> Ibid, p.204. In the essay entitled 'Application of servomechanism theory to production control', Simon draws 'obvious analogies' between powerful techniques developed for the analysis of electrical and mechanical control systems and servomechanisms and human production control systems used to plan and schedule production in business concerns. ' . . . the notion of a servomechanism incorporating human links is by no means novel . . . many gun sighting servos involve such a link . . . all such systems would be included in Wiener's general program for cybernetics.' Simon, *Models of Man*, pp.219-24.

<sup>41</sup> Archer, 'Design, innovation, agility', p.567.

perhaps as more accessible to his intended audience, the notoriously unintellectual British designer.<sup>42</sup> Citations can be found in Archer's work to Bertalanffy, and to Wiener, but are more often to writers such as Russell Ackoff, Stafford Beer, and C. West Churchman, who made plain the potential of an applied, objective and unified social science for management and control.<sup>43</sup> A similar pattern of citation is to be found in the work of others who wrote in favour of Design Methods, with British and North American authors in particular favouring the secondary material and a more atheoretical stance.

But such operationalised knowledge did of course bring theoretical assumptions which betrayed its close links to behaviourism, and which were of considerable import for the King's Fund Bed. As outlined in Chapter Two, the first article in Archer's series *Systematic Method for Designers* described a key 'man-tool-work-environment system', in which each element might react on each of the others, which served to make a tool-using individual situated among environmental variables the subject of enquiry. He represented this by means of a diagram consisting of a circle with three equidistant points on its perimeter labelled tool, work and environment. At the centre is a line drawing of a woman operating a vacuum cleaner, labelled (wo)man. The three points and the central figure are linked by arrows to each other in both directions. The diagram is said to 'imply' nine activities: man acts on tool, tool acts on man, man acts on work

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<sup>42</sup> As Platt points out in her survey of sociological research methods, one cannot assume that the citation of a particular author means that their methods were actually employed, but makes the relevant point that patterns of citation are closely linked to questions of intended audience. Platt, *A History of Sociological Research Methods in America*, p.139.

<sup>43</sup> Ackoff, *Scientific Method*, 1962, Stafford Beer, *Decision and Control*, New York, John Wiley, 1966, C. West Churchman, *Prediction and Optimal Decision*, New York, Prentice-Hall, 1961.

. . . and so forth. Earlier exponents of systems theory including the English author J.G. Bennet had elaborated complex theories of the properties of systems composed of monads (single entities), dyads (two related entities), triads (three related entities) and so on. In Bennet's terminology, similar to Archers, each was said to 'imply' certain properties, and the triad is represented diagrammatically by the same device, the punctuated circle of arrows, which Archer used to represent the design process. There is, after all, no reason *per se* why a circle of arrows should represent the design process, but the diagram did useful work in abstracting the design process to a generalised system. Diagrams have not been greatly studied in the history of science or representational practice generally, but the studies that do exist suggest they are a fruitful area to explore. It is perhaps not entirely coincidental that one of the rather few analyses of the work done by diagrammatic representation concerns the publications of E.O. Wilson.<sup>44</sup> The architect of sociobiology, Wilson, like most proponents of design methods, was also preoccupied with the relevance of natural science to the social world.

Formulating the design problem in this way led rather directly to the individual nurse and the work which she did with the bed becoming the primary focus to which disciplines employing the methods and concepts of the behavioural sciences could be applied. Those to which Archer had greatest recourse were ergonomics, together with the anthropometrics on which it was based, and, to a lesser extent, applied psychology in the later, evaluative stages of the project. Most of the history of ergonomics to date

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<sup>44</sup>G.Myers, 'Every picture tells a story: Illustrations in E.O. Wilson's *Sociobiology*', in M.Lynch and S. Woolgar, *Representation in Scientific Practice*, Cambridge, Mass., The MIT Press, 1990, pp231-266.



has been written by practitioners, especially those who fostered the subject in the immediate post-war years having been involved with military operational research.<sup>45</sup> But it was not only its war-time origins that ergonomics shared with other cyborg sciences. Participants describe seemingly obvious improvements waiting to be made to the design of equipment and the workplace once somebody (i.e. a scientist) studied it objectively. Donna Haraway provides an alternative perspective in her account of the sociobiological synthesis of the 1970's, describing ergonomics as being:

. . . about optimising the energy-information relations of all known components in the organisation of labor . . . the second systems theoretic tool for reconceptualising organisms and societies . . . a cybernetics of the hierarchical division of labour.

which provided the data for the optimisation techniques of operational research.<sup>46</sup> The central recourse to ergonomics in the bed project had rather direct consequences. It prioritised consideration of firstly, work over 'not work', and therefore nurses (workers) over patients, and secondly, the individual over the social, nurses over nurses as a group.<sup>47</sup> I shall pursue first the question of the 'not-workers', that is the patients.

It is striking how often published accounts of the King's Fund Bed specification gave improved patient comfort as the primary reason for the new design. Journalists seem to have assumed this to be the case.<sup>48</sup> The

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<sup>45</sup>See for example Murrell, 'How Ergonomics Became Part of Design', pp72-72.

<sup>46</sup>Haraway, 'The High Cost of Information', p.250.

<sup>47</sup>It was noted by the RCA team during a subsequent project to design a commode that the commode was a 'patient aid', not a 'nursing aid' like the bed. AAD/1989/9, Job 124.

<sup>48</sup>For example, 'A bed to succour the sick', *New Scientist*, 9 March 1967, p.463.

King's Fund Working Party, in the document summarising their findings before the RCA team joined forces with them, listed the patient's needs first. From time to time after this, Working Party members raised concerns to do with patient needs. During preparation of the questionnaire to the Chase Farm patients, for example, they directed that 'a question should be included in the attitude survey to determine what advantage would be gained if the backrest was operable by the patient', though no such question appeared in the final questionnaire.<sup>49</sup> In practice, the fact that the trials were being carried out with formal procedures overseen by the RCA team meant the latter's concerns largely prevailed. Archer had made it clear from the outset that subjective issues, such as comfort, were 'notoriously hard to measure'. Where issues concerning patients' use of the bed *were* susceptible to objective measurement, either directly, or by means of indicators, they were certainly addressed. They were to be discovered largely by referring to anthropometric and physiological data. (Not surprisingly, rather little ergonomic data concerning patients existed.) It was anthropometric data for males up to the ninetieth percentile lying down that determined the bed length initially stipulated in the first draft specification, a significant increase on the usual length for hospital beds. Quantifiable behavioural indicators were also employed. Statistics concerning falls from or around hospital beds mattered to hospitals, were widely available, and could be invoked in support of a low height facility which would assist patients getting in and out of bed or reduce the severity of falls from the bed.

But other factors in the methods adopted, which were geared to

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<sup>49</sup> A/KE/PJ/17/19, KFWPHB Minutes, 5.5.65.

studying one sort of behaviour, that is work, tended to diminish the prominence of behaviour concerned with 'not work'. So although the list of bed usages contained those of being 'an identifiable home to the patient, or of providing privacy, these were not often correlated with specific, distinguishable and therefore countable behaviours. The techniques involving numerical ranking that were used in the early stages to 'direct the designers attention to what was important' were derived from the list of bed usages. 'Critical factors (those properties necessary to support a usage/activity) were attached to each usage, and a ranked list of factors produced by means of placing those which were relevant to more usages/activities above those relevant to less. And although the overall number of bed usages relating to patients was greater than that relating to nurses, the usages relating to nurses were defined according to different kinds of work practices which made them susceptible to sub division into large numbers of activities. Therefore nurses' 'use of the bed as a treatment table' comprised five activities, demanding twelve critical factors, and each time a critical factor was ascribed to an activity, it rose higher on the ranked list. Use of the bed as an examination table, and as a workbench, were listed separately, further adding to the number of relevant activities demanding critical factors. At the other extreme, patients' 'use of the bed as a social centre', required no critical factors, only general appearance being relevant.<sup>50</sup>

Such techniques contributed in large measure to the bed being height adjustable. This elegant solution to the conflicting needs of patients

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<sup>50</sup>Royal College of Art, Studies in the function and design of non-surgical hospital equipment, Report No17 *General Purpose Hospital Bedstead: summary of analyses leading to user specification*, May-August 1964.

and attendants potentially solved the objectively measured problems (such as height, falls, lifting) of both groups, but had implications for the 'notoriously subjective' issue of comfort. With the mattress at the specified lowest height, there was very little space below the mattress platform to accommodate both the mechanism and room for attendants to get their feet, or cleaning equipment, underneath. To maximise this and still achieve the low overall height, the mattress itself had to be as thin as possible. (The design of the mattress was not within the specification, but a thin mattress was an almost inevitable requirement if the full range of height adjustment specified was to be achieved.) This resulted in criticism from some quarters and in the team specifically searching for evidence that patients could be comfortable on four inches of foam. (Sprung mattresses, still often used in hospitals at the time, could not be made as thin as this.) Although the low height was partly for the benefit of patients getting in and out of bed (this also reduced nurses lifting problems), the underbed clearance problem arose because of the mechanism to raise the bed to the optimal height for nurses and medical attendants.<sup>51</sup>

The solution was not of course a necessary one. Even when there was agreement on the problem, different solutions were available. U.S. bed studies, also considered a contribution to rational design making in the hospital field and based largely on anthropometric and ergonomic data, also found that high height was best for nurses, and low height best for patients, but some had concluded 'that nurses did not spend enough time

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<sup>51</sup> A focus on the ergonomics of lifting also inclined the team to make the bed as narrow as possible. Physiotherapists to whom they suggested running a trial of this told them it was common knowledge that lifting patients was easier in a narrow bed, and thought what ought to be investigated was whether patients were comfortable in narrower beds. Interview, Gillian Patterson, 29.1.98.

by the bed to warrant adjusting it to their needs'.<sup>52</sup> American nursing practice differed from British, but presuppositions about how important nurses' needs were clearly affected the outcome here, as they did in the RCA study, but with different result. In theory, the RCA study could have come to the same conclusion; how much time by the bed was 'enough' to warrant adjusting the bed to the nurses' needs? If the issue was to be decided by who spent more time in proximity with the bed, then the patient would always win out. But in the RCA study different presuppositions about the bed 'problem' prevailed; presuppositions about work, workers, labour shortage and expenditure in the NHS. The breakdown of bed usages, apparently so obvious as not to require the substantial evidential justification that accompanied each point in the resultant specification, in fact relied heavily on an ergonomic view of the bed. 'Not work' was largely invisible to the method, unless it could be dealt with anthropometrically, or, sometimes, but not always, physiologically. Laboratory research on sleep was taken into account, for example, but some pressing patient concerns do not appear to have been constituted as design problems by the team, even though they had a physiological component.

Perhaps the most prominent of these was the question of bedpans. Most available sources of information on hospital inpatients' views suggested that the use of bedpans was one of the most disliked aspects of life in the ward.<sup>53</sup> The 'bed pan round' was still a feature of ward routine in many hospitals in the 1960's, with bed space curtains relatively new and not universally installed. (Movable screens around beds were used prior to

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<sup>52</sup>Ganong/Smalley

<sup>53</sup>See the sources in notes 57, 58 and 59.

this, though not, apparently, in some military hospitals). Early on in the project, Doreen Norton told the RCA team 'our hospitals are not well provided with toilets: we will therefore use bedpans for some time.'<sup>54</sup>

Although the purposes of a bed listed by the RCA study included those of providing 'an identifiable home' to the patient, and privacy, the team dealt with the bedpan question under the bed usage described as 'a place for excretion.' Consideration here was largely from the point of view of the nurse: the critical factors said to be involved were 'height adjustment, stability, drainage, cleaning, parking for vessel, and tucking in surfaces'; a statement of the attendant's requirements rather than the patient's, assessed from a mechanical, rather than an attitudinal point of view (nurses didn't like bed pans either).<sup>55</sup>

Again, the solution was not, per se, a necessary one. A bed available on the US market incorporated 'a personal toilet and shower'. Whilst the team's preconceptions as to what would be acceptable financially would have undoubtedly (and correctly) precluded such a solution, it does seem that the problem of bedpans had not figured large. And although subjective issues of patient's embarrassment were at stake, so were physiological ones of constipation. But not surprisingly, ergonomic data on defaecation was unavailable, despite the fact that it, too, was reducible to dimensions, muscular forces and motivation. Less emphasis on height adjustment and its mechanism would perhaps have allowed for the exploration of innovative solutions which might have alleviated to some

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<sup>54</sup> AAD/1989/9, Job 7, note of conversation with Doreen Norton, 29.11.63.

<sup>55</sup> Royal College of Art, Studies in the function and design of non-surgical hospital equipment, Report No17 *General Purpose Hospital Bedstead: summary of analyses leading to user specification*, May-August 1964.

extent problems of privacy and posture for the patient, and of lifting for the nurse. These, however, might well have required use of the under-bed space that was largely unavailable because of the demands of adjustable height and its mechanism.

Apart from anthropometric and some physiological data, nursing opinion was the other principal source of information on patients. Although the occupants of beds in the Chase Farm trials were asked for their opinions by means of a structured questionnaire, patients' views do not appear to have been solicited in the decisive early stages of the project prior to the publication of the draft specification. None were included with the groups of hospital staff answering the *Panorama*' questionnaire, though plenty of former hospital patients must have been among those watching prime-time television. Nor do any of the 'focus groups held in the early stages of the project seem to have involved them. This was a rather direct result of the methodological concerns, but was also perhaps not surprising given the status of most hospital patients in Britain throughout the 20th century, as either objects of charity or beneficiaries of the State. The studies of everyday life in NHS hospitals which began to appear from the late 1950's onwards had a number of consistent themes. Patients, it seemed, were often not treated as responsible adults and found it hard to obtain information about their condition. Hospital life was characterised by petty rules, inflexible regimes and loss of dignity and privacy. On the whole, however, nobody complained very much.

In 1958, the Central Health Services Council had commissioned *The Pattern of the In-Patient's Day*, published in 1961.<sup>56</sup> The much-cited *The*

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<sup>56</sup> Central Health Services Council, *The Pattern of the In-Patient's Day*, HMSO, 1961.

*Patient's Attitude to Nursing Care*, by Anne McGhee, was also published that year.<sup>57</sup> This work was certainly known to the RCA team. Articles in the hospital press included 'The Patient's View of the Hospital' by S.C. Haywood et al.<sup>58</sup> The tone of these studies was moderate and criticism was implicit rather than overt, but the patient was at least now visible to other than the medical gaze. And an alternative source of patients' opinion provided distinctly alternative views. The years immediately following 1948 had seen little adverse comment from users of the NHS, but by the mid 1950's a small but growing number of complaints began to appear in the national press. These largely concerned the 'high-handed' way in which patients were treated and their lack of various rights. A well-known journalist gave his distinctly negative views on being a patient to the national and hospital press; he had experienced:

. . . inexcusable examples of rudeness and thoughtlessness . . . routine automatically took precedence over the patient's comfort and his basic right as a human being to know what was being done to him . . . When I asked the nurse what injection she was giving me, she snapped that it was nothing to do with me.<sup>59</sup>

Another journalist's account, *What's wrong with the hospitals?*, by Gerda Cohen, was outspoken about 'a world of hierarchies, humiliations, rules and condescension'.<sup>60</sup> The Patient's Association began 'ten years hard

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<sup>57</sup> Anne McGhee, *The Patient's Attitude to Nursing Care*, Edinburgh, E & S Livingstone Ltd, 1961.

<sup>58</sup> S.C. Haywood et al., 'The Patients View of the Hospital' *The Hospital*, October 1961, pp.644-650.

<sup>59</sup> Stanley Hill, 'SGH talks to Mr Derek Hart', *Hospital Management*, March 1967, pp.128-129.

<sup>60</sup> Gerda L. Cohen, *What's wrong with hospitals?*, Harmondsworth, Penguin Books, 1964, cover.



campaigning' in the mid-1960's which eventually obtained for patients the right to refuse to be used as 'teaching material' for medical students and junior staff.<sup>61</sup> In the 1960's patients could not opt out of this, nor, depending on the whim of ward sisters, might they be able to have personal belongings on view on bedside lockers or choose whether their bedclothes were crumpled or straight. Given these prevailing attitudes, and the fact that most information about patients' views which the team solicited, apart from the Chase Farm questionnaire, seems to have been through nurses, it is perhaps not surprising that certain choices regarding bed design were apparently eliminated from consideration at an early stage.

This point is related to a second criticism of early design methods, made increasingly frequently as the 1960's wore on. This was the premise that they began from a 'clean slate', that is, without assumptions about solutions. Most proponents, including Archer, designated the initial stage in the design process as information gathering. Many seem to have regarded this as a purely inductive process. Janet Daley had had little difficulty demolishing this model with a brisk account of the history of empiricism from Hume to Kant, and critics of many persuasions took issue with the notion that innovation could arise 'de novo', or that the designer could put himself in such a 'preconceptionless' state; inevitably designers brought assumptions to problems which actually prestructured them, and thereby prefigured solutions.<sup>62</sup> The notion of the designer as purely objective information gatherer and abstract problem solver was untenable. 'External'

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<sup>61</sup>Helen Hodgson, 'Hobson's Choice in the NHS', *Health and Social Service Journal*, September 6, 1975, p.19.

<sup>62</sup>Daley, 'A philosophical critique of behaviourism in architectural design', p.73.

factors prestructured the problem, whether these were overt, as in express client demands, or less overt, as in prevailing societal norms to do with appearance, or economics, or standards. In addition, 'internal' factors ensured that 'what is to be called data is already determined by some prior theoretical exercise.'<sup>63</sup> In his later rejection of design methods, Jones

asserted that:

The interdependency of (problem and solution) is evident throughout. The initial expression of objectives, or needs, however abstract and absolute, is, I think, full of hidden assumptions about how the person satisfying it thinks it can be satisfied, eg the statement "solve the unemployment problem" could imply that we are to become engaged in a search for jobs of some kind, but an imaginative response may well suggest ways of workless living in which unemployment is no longer the problem.

Other critics made the related point that it was impossible to 'know' everything about the problem, in advance or perhaps ever. Alexander, writing about architectural design, asserted that 'the difference between a really good lobby and a really bad lobby will hinge on much subtler questions which most of us don't know.' He cited the example of a new courthouse intended to diminish the backlog of cases waiting to be heard. Doing away with the long corridors and passageways of the older building had had the reverse effect, since many out of court settlements had apparently been reached while traversing them in relative privacy. The story may be apocryphal, but it served to emphasise the reliance placed on prior 'information gathering' stages. Like most of the early design methods, Archer's divided the process into stages. These varied between methods but usually involved at least analysis, synthesis and 'feed back'.

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<sup>63</sup>B. Hillier et al. 'Knowledge and Design', in Cross (ed), *Developments in Design Methodology*: 258.

Analysis culminated in 'an initial statement of the problem, all that is known'. Certainly this was to be qualified by 'feedback', which might affect the statement of the problem, or, for any proposed solution (prototype or 'hypothesis'), the details of design. But the King's Fund Bed project is indicative of just how influential the 'initial statement of the problem' could be for subsequent stages and the eventual outcome. If the first draft specification for the bed is taken to be the 'initial statement of the problem', two points are of note. Firstly, the final specification, published nearly three years later, differed from it only in aspects of detail, and secondly, the extent to which this initial statement was compiled from abstract information gathering, either written sources or the formalised 'expert opinion' which had to be drawn on in the absence of those sources. After this stage, the team considered there to be only twelve questions about bed design to which they required answers and where there was no general agreement among their sources. This was the basis for proceeding to the television survey. A very short time (less than three months) after the results of the survey were received, the first version of the draft specification was completed.<sup>64</sup> After this, being less interested in designing than in design methodology, Archer gave the job of designing the prototype to Agnew, and did not actively direct his work.<sup>65</sup>

The determining nature of the earliest stages of the project seem inescapable, and Archer's comments about the organization of his year's

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<sup>64</sup>The draft specification was presented to the Working Party on 6.5.64 and a design specification their next meeting on 18.6.64 where it was approved with one or two amendments. It was then agreed that, although the draft specification would be sent for comment to participants in the enquiry, fresh amendments would only be made 'in the light of new evidence which could be regarded as conclusive'. A/KE/PJ/17 KFWPHB Minutes, 18.6.64.

<sup>65</sup>Interview, Bruce Archer, 9.5.00.

work with Butter, 'as soon as you have put something away in a filing cabinet you have embarked on a particular method of working', together with the fact that he preferred not to see other bed designs early on in the project not wanting them to influence the specification, resonate strongly with the idea of beginning with a clean slate, in as near an approximation to objective scientific method as possible. But some crucial prior assumptions affecting design decisions were not made overt; assumptions about cost, for example. It was decided that a unit cost should not be specified, because the prime concern was to determine the 'best' solution, on the other hand, the aim of the specification was to include 'only what was essential'.<sup>66</sup> What was deemed essential, however, was clearly the result of preconceptions which the RCA team had acquired from well beyond the confines of the method. Design decisions were often made based on the assumption (certainly correct) that the Health Service would not contemplate a 'very' expensive bed, and that unit cost would have to be kept down. This was understandable, given that the team's initial introduction to the 'problem' of hospital bed design had been in the context of concern over labour and economics in the NHS. But this was a rather different problem from the one which the King's Fund Working Party had originally been formed to address, of how individual hospitals should choose the best beds for their patients. This latter problem might have been solved, for example, by comparative testing and a 'best buy' list, such as was employed by the new consumer organisations. Shared

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<sup>66</sup>When the RCA prototype was being tried out in the experimental ward set up at Greenwich by the Architect's branch of the MOH for example, Agnew was encouraged to include a 'monkey pole' (a bar on a chain above the head end of the bed that could be used by patients to pull themselves up). He refused on the basis of increasing unit cost. AAD/1989/9, Job 15, Howard to Agnew, 31.5.66.

assumptions about the problem, and its solution (variety reduction), enrolled political support.

## Politics

It seems highly unlikely that the King's Fund Bed would have appeared in British hospitals at all without this support. There were many contingent circumstances at various levels in the MOH (and later the DHSS), and in the hospital service, which served to further the project and the resultant specification and beds built to it over the period from the early 1960's to the mid 1970's. In the early 1960's, for example, Enoch Powell was embroiled in the conflict over nurses' pay. His rigid imposition of the government's 2.5% pay freeze on a group widely perceived as under-remunerated and unfairly treated, brought approbium even from his own party. The issue of the nursing shortage was powerful ammunition for those who supported a more generous increase in nurses' wages; so powerful indeed that, in 1961 under Powell the MOH declared 'public war on the myth of "shortage" of nurses'.<sup>67</sup> In the light of this It is not difficult to see why 'mechanization of the nurses task', and the consequent saving of nurses' time, had been of considerable interest to him. MOH staff were deputed to follow up reports of 'robot nurses' in the press<sup>68</sup>. The initial focus on the hospital bed as the first item of equipment for scrutiny to this end was a very direct result of

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<sup>67</sup> Webster, *The Health Services since the War*, II, p.173.

<sup>68</sup> Not, it turned out, cyborgs, but the electronic monitoring devices that were to become commonplace in the new intensive care units as early warning devices, but which were first marketed, astutely perhaps, as aids to saving nurses time. Davies to Hollens, 13.7.62. MH136/12.

Ministerial strategy in the imposition of government policy on public sector pay in support of their wider economic policy.

As the nurses' pay issue receded, at least temporarily, this concern dwindled. The interests of the next Minister of Health, and of senior MOH civil servants, centred more directly on equipment expenditure, both because of criticism from the Public Accounts Committee, and because of the implications of the Ten Year Hospital Plan. These issues enabled the Ministry to revisit the issue of joint and central contracting, and its necessary prerequisite in the field of equipment supply, standardisation. Too wary to promote official policy encouraging standardisation since the Messer Committee's findings in 1958, the MOH position was strengthened on this by the Public Accounts Committee's pronouncements of 1962 and 1963. As a newly appointed Minister of Health, Anthony Barber's concern to refute accusations of wasteful spending were understandable, and manifest in his speech of January 1964 announcing the setting up of specification working parties. The MOH undertook to provide specifications for 22 types of equipment by the end of 1964, but these could hardly be expected to report before the end of the financial year 1964/5. The King's Fund Bed project offered hope of an earlier, high profile, result. (In the event the delays outlined in Chapter Three prevented this.) Hunt, as Controller of Supplies, and the individual who had to go before the Public Accounts Committee in February 1965, had every reason to promote evidence that the issue was being vigorously addressed for one key piece of hospital equipment. It is clear that once this purpose was served, however, the Ministry were not contemplating a repeat of such an extensive, and expensive, procedure. Aware in 1965 that Archer and Harrison 'intended to recommend that a permanent team to evaluate

equipment should be set up in the Health Service', Supplies Division considered this was just 'not on'.<sup>69</sup>

The context of the Ten Year Plan was highly relevant. Although widely applauded as evidence of Powell's far-sightedness in 1962, there had been concerns from the outset that the project would be unsustainable on the planned levels of expenditure. These proved to be correct. A radical revision of the Plan was announced by the Minister of Health (now Kenneth Robinson) in 1966 which modified or postponed several schemes.<sup>70</sup> From the outset in 1962, advocates of the Plan had had to protect it both rhetorically and practically. The unusual seniority of the MOH's first representative on the King's Fund Working Party is understandable in this light, particularly in view of the fact that the Undersecretary in question, Raymond Gedling, was apparently the civil servant who had originally drafted the Plan.<sup>71</sup>

The Ten Year Plan magnified everything it touched, including expenditure and potential savings through standardisation. During the bed project the MOH veered between alarm at the former and attraction to the latter. In the mid 1960's, anxious to produce at least one specification for a piece of equipment, and make at least one version commercially available to hospitals, the MOH agreed to fund Archer's field trials when the King's Fund drew the line at further expenditure. The Ministry subsequently provided the initial large order for Nesbit-Evans without which the latter had

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<sup>69</sup> A/KE/PJ/17/28, Irfon Roberts' note of a phone conversation with Howes, Supplies Division, 7.10.65.

<sup>70</sup> *The Hospital Building Programme. A Revision of the Hospital Plan for England and Wales*, HMSO, 1966.

<sup>71</sup> Interview, Lawrence Brandes, 2.10.00.

been unwilling to proceed. But for these two interventions, it is unlikely that King's Fund Beds would ever have come into existence as commercial products. The brief for the King's Fund Working Party was only to produce a specification. Confronted with an apparently unrealistic one, and what was to them a rather extraordinary prototype, the rest of the bed-making industry would probably have ignored the whole affair.

By the time the bed specification was published in 1967, and the real negotiations on pricing, contracting and supply began, the Ministry's concern with expenditure surfaced again, detectable in their cautious official statements and two year hesitation before allowing purchase on central contract. This had the ironic result that, whereas initially advocates of the specification had stressed the large proportion of patients for whom the bed was suitable, in order to emphasise the potential benefits of standardisation such as joint contracting and price reduction, they now pointed out that there were sizeable groups of patients for whom it was *not* necessary.<sup>72</sup> This, it seems, was in order to convince the MOH to make it available on central contract at all. Between 1967 and 1969, the Ministry conducted a sort of damage limitation exercise based on identifying just what proportion of patients actually 'needed' the bed. For them, the project had been almost too successful. This was at least in part because the long-expected opposition to standardisation, which might have served to limit demand for this expensive bed, had largely failed to materialise. Why was this?

In large part the answer seems to lie in the radical changes in

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<sup>72</sup>Early Reports and specifications had described a bed 'suitable for the majority (say, 60%) of patients being nursed in the ordinary wards of hospitals'. The final published specification for the King's Fund Bed described 'a bedstead suitable for general purposes'. King's Fund, *Design of Hospital Bedsteads*, p.5.



hospital management that took place during the 1960's. The seemingly inexorable trend away from lay committee management towards management by senior officers, increasingly with specialist 'management training', was both promoted by, and served to promote, a rhetoric of rational management that reverberated stridently through public and private sectors alike. In the hospital service, 'new building' was linked very closely to 'new management' The inherited "patchwork quilt" with an infinite range of variation of procedures, methods, organisation, staffing and buildings, will gradually be replaced, through the operation of the Hospital Plan, by a more logical system of hospital services and buildings and this in its turn will inevitably entail changes in the control and management of the resources at the disposal of the hospital service . . . the rationalisation of hospital services and buildings must be paralleled by the rationalisation of hospital management<sup>73</sup>

The hierarchy of 'line management' supplanted the older 'Bradbeer style' administration and the 'trichotomy' of matron, consultants and hospital secretary. In general this was welcomed by the MOH and promoted by the DHSS. It was the system which prevailed in the Civil Service itself and one which offered potential relief from the intransigencies of both lay HMCs and the consultants. The shifting alliances brought about by these changes are detectable at many instances in the project. As noted above, when the King's Fund declined to fund the field trials, Archer went directly to Hunt to enlist Ministry support. It was at this meeting that the comment about the King's Fund Working Party being 'liable to go off in all directions at a moment's notice, and most atypical of the hospital

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<sup>73</sup>Anon., 'Hospital Work Study makes progress', *British Hospital and Social Service Journal*, 12 April 1963, p.417-417.

service as a whole' was made. An editorial in the *British Hospital and Social Service Review* in 1966 was in no doubt that it had become 'more and more obvious that active management was a matter for professional officers and not for amateur committees'.<sup>74</sup> The King's Fund Working Party was of course an advisory body brought together by a charitable foundation, not a management committee, but the relevance of lay committees to the hospital service was under scrutiny at this time.

Within the changing management ethos of the NHS, the role of the supplies officer also altered. Around 1960, supplies officers were a diverse and nervous occupational group who considered themselves 'a threatened species'.<sup>75</sup> In the eyes of some hospital administrators at this time, the best sort of supplies officer was still 'the quartermaster who got the ammo up the line.' A few hospitals had begun to experiment with dispensing with the post altogether, leaving ordering entirely in the hands of the finance officer or a Secretary/Supplies Officer.<sup>76</sup> The relatively low status of supplies officers at this period, and their exclusion from policy making is clear. The function of the MOH's Standing Advisory Committee of Supplies Officers, in existence since 1951, was still, in 1960, 'to discuss day to day supplies problems informally; questions of policy were not proper to these meetings and would not be discussed.'<sup>77</sup> In the early sixties, standardisation appeared to threaten the supplies officer's role even further, restricting his purchasing choice and reducing him to an order clerk. But by the end of

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<sup>74</sup>Committees and Management, *British Hospital Journal and Social Service Review*, August 5, 1966, pp1442-3:3.

<sup>75</sup>Minutes of a meeting to discuss joint contracting, 17.10.61, MH136/17.

<sup>76</sup>'The Supplies Function', *British Hospital and Social Service Journal*, June 7 1963, p.1053.

<sup>77</sup>Davies to Hughes, 28.4.60, MH 90/81

the decade, involvement in new hospital building and increased expenditure had given supplies officers a key place in the new, rational management with its emphasis on information and control. The supplies officer dealt with eminently quantifiable assets and outcomes. Perhaps even more importantly, he could himself be controlled within a chain of command, having no troublesome specialised knowledge beyond that of his counterpart in commerce or the military.

These changes were reflected in a new salary scale for supplies officers and in changed attitudes. More secure in their positions, they now endorsed 'rationalisation' of supplies, including standardisation, thus gaining visibility and credence with management, whose objectives they came increasingly to embrace as their own. In particular, standardising the supply function itself, by separating it from the hospital group structure, and therefore direct control by HMCs, appeared now to offer potential advantage.

The recommendations of the Hunt Committee for the organization of supplies on an area basis were opposed by some long-serving supplies officers who warned that they would be returned to conditions resembling the pre-NHS era when, in London County Council Hospitals, for example, they had been 'unable to condemn so much as a scrubbing brush' without a visit from a condemning officer from the supplies department who came every fortnight for the purpose.<sup>78</sup> Less nervous colleagues however, considered that 'the future for the supplies officer lies with the Hunt report.'

The variation in size of hospital groups meant that Some supplies officers were responsible for a group of 1.500 beds, but in smaller groups a clerk filling in forms was referred to as supplies

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<sup>78</sup>'Hospital Supplies and the Hunt Report', *British Hospital and Social Service Review*, 9 December 1966, pp.2361-2367:2365.

officer. ..there should be no heartburnings if Hunt casts the clerk out into clerical work . . . Supplies officers should . . . regard themselves as part of the main stream administration, and aim for the highest posts . . . supplies officers had been recognised to be educated men and specialists' (though 'still not sufficiently. In the USA . . . the purchasing agents are master men').<sup>79</sup>

The real power shift implied in the Hunt Committee's recommendations was again towards the centre, to 'areas', not regions, but certainly away from the HMCs.

But what of medical opposition to standardisation of equipment?

This was, after all, what had been identified as the cause of all those different available bed designs in the first place. In the event, this failed to materialise, except among geriatricians. In 1970, the year after the DHSS made the King's Fund Bed available on central contract, a consultant geriatrician, James. Andrews, published an article in the *British Journal of Hospital Medicine* entitled 'Geriatric Ward Equipment'. In it he cited the patient area furniture report produced by the DHSS in 1969 which had stated that certain items 'were more in the nature of medical equipment than furniture and should be purchased locally in accordance with the view of the geriatrician'.<sup>80</sup> He took the DHSS to task, therefore, for subsequently stating in the same report that where contracts were made centrally for specific items their use by hospital authorities 'should be made mandatory'. In Andrews' view, 'the days of ordering 30 identical beds for a 30-bed ward should have gone'. Given that he was writing in 1970, only six years after the Minister of Health had expressed dismay that over 300 designs of bed

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<sup>79</sup> Ibid.

<sup>80</sup> J. Andrews, 'Geriatric Ward Equipment', *British Journal of Hospital Medicine*, Equipment supplement, April 1970, pp21-25:21.

were available to hospitals - the situation that had in part given rise to the King's Fund project - the days of ordering 30 identical beds for a 30 bed ward must have been very short indeed. Andrews devoted much of the content of the paper to beds, and references to the King's Fund Bed were largely critical, or damned with faint praise.

But he was one of only a handful of doctors who had anything to say about the issue. Given the zeal and relatively high profile which the King's Fund gave the project in hospital circles, and the assiduousness with which Archer and his team were known to be soliciting information, medical interest in the subject overall was rather slight. Specific enquiries placed by the RCA team in the *British Medical Journal* and the *Lancet* in 1964 as to degrees of tilt actually used or required in practice resulted in only two replies from doctors over the subsequent six months. Andrews himself opened one of his articles with the words 'All consultants talk about hospital beds but few are interested in them'.<sup>81</sup> He was probably right. For the general physicians and surgeons it is likely that beds had become of less concern. The power of their intervention was increasingly wielded through other categories of diagnostic and therapeutic artefacts: scanners and endoscopes, gamma rays and heart lung machines. These were specific, interventive (and very expensive) tools and techniques at the 'cutting edge', not non-specific issues of bed rest, diet and locomotion which were central to geriatrics. Apart from geriatricians, and perhaps the allied groups of long-stay institution doctors, only the orthopaedic surgeons still evinced much interest in hospital beds. But orthopaedic beds were contraptions central to their treatments of traction, extension and so on,

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<sup>81</sup> J. Andrews, 'Hospital Beds', *The Lancet*, February 27, 1971, pp.442-443.

and as such securely in the category of 'surgical equipment'; that category which the RCA team had agreed was 'out of bounds.' It was the geriatricians in particular who still felt their interests threatened by variety reduction in 'general purpose' beds. Several published requests for specialist geriatric beds. Andrews considered it 'unfortunate' that the Chase Farm trials had been on a women's surgical ward, and that this reduced their relevance to use by geriatric patients. However, as Harrison, the work study officer in charge of the trials, pointed out, many of those women surgical patients were also geriatric 'as Andrews well knew'.<sup>82</sup> Their positions were predictable. Andrews, questioning the suitability of the bed for geriatric patients, chose to point out that the trials had been held on a surgical ward. Harrison, responsible for the trials being properly carried out and therefore meaningful, chose to stress that many of the surgical patients were 'old', and *ipso facto*, geriatric. The geriatrician, however, had a point. As noted above, the definition of the geriatric patient was problematic in the late 1960's. The work study officer saw it purely as a physical (and quantitative) matter of chronological age, and if old people defined in these terms had been included among the trial patients, then the bed had been 'tested' for them, too. But this was not all there was to it. Archer had expressly chosen a female surgical ward for the trials for particular reasons. Female surgical patients could be seen as being, transiently at least, the group of general hospital patients who were most dependant on hospital staff and subject to the widest range of 'interventions' from them. Furthermore, the temporal pattern of many surgical patient's condition, passing from total incapacitation to, it was to be

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<sup>82</sup>AAD/1989/9, Job 15. Correspondence, April 1970 'Response to Andrews'.

hoped, total recovery, provided the widest range of situations in which to test the bed. Hospital life for geriatric patients did not follow this pattern. Their condition generally changed slowly, or remained static. They were not usually having surgical treatment, or other interventionist procedures. Their beds were not foci for 'early ambulation', but places where they might sleep for 12 hours or more. Some of the new geriatric units were experimenting with more flexible routines akin to domestic, rather than institutional life.

Defining the geriatric patient as different was essential to defining the relatively new and still insecure specialty of geriatrics. One of the founders of hospital geriatrics, the eminent physician Cyril Cohen, felt it necessary to reply to comments from the Group Secretary who had had difficulty in defining a geriatric patient (see Chapter Four, note 10) with a two page article. Geriatric medicine was 'a distinct branch of general medicine', there were 'fundamental differences between the medicine of the elderly and that of younger people.' It required 'special study and a great deal of research'.<sup>83</sup>

But for most doctors in the late 1960's, it seems standardisation of beds posed little threat and was of rather little interest. Had matters gone further, however, things might have been different. In the United States, the hospital administrator Gordon Friesen had pushed standardisation and rationalisation of hospital supply to its limits, designing the entire hospital around the supply function.<sup>84</sup> Friesen 'sought to exploit Taylorist possibilities to the full' in a brief for ten United Mineworkers of

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<sup>83</sup>Cyril Cohen, 'Planning and reality: Geriatrics', *Hospital Management*, August/September 1967, pp.423-424:424.

<sup>84</sup>Hughes, 'The Design of Hospitals in the Early NHS', pp.39-40.

America Welfare and Retirement Fund hospitals in Virginia and Kentucky. A major part of the brief involved the removal of the maximum number of functions to central departments away from the ward, where they could be 'surveyed, controlled and rendered more efficient through the application of work-flow studies, job specialization and mechanization'. To a very limited extent, this system was adopted in British hospitals for departments such as central sterile supplies. The 'matchbox on a muffin' style of hospital architecture lent itself to the arrangement, with centralised departments located in the vertical central core. But there were 'knock on' effects of centralising services away from the wards which proved profoundly unsettling to some British observers, who commented on Friesen's 'objective, almost ruthless attention to every detail of the supply system from . . . service areas to every item in the patient's room.' In particular, was 'it necessary to box in the patient with supply cupboards and lavatories, so that he cannot be seen from the nurse's station or corridor?'<sup>85</sup> Such a system challenged a tenet of British hospital ward organisation so entrenched that most administrators, it seems, regarded it as sacrosanct. This was the view that patients must be continuously visible. The concern dominated to a large extent the many debates on improved ward design held during the 1960's, promoted by the Nuffield study and embodied in the experimental wards at Greenwich, Larksfield and Muswell Park.<sup>86</sup> The matron at Greenwich, speaking at a conference in 1965: was sceptical about the six-bed wards being planned in many new

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<sup>85</sup>'Ward Planning', *British Hospital and Social Service Journal*, June 28, 1963, p.754.

<sup>86</sup>Experimental ward blocks were built at Larksfield Hospital, Greenock, 1951-6, and Musgrave Park, Belfast, 1956-9, as part of the Nuffield Hospitals Programme. The MOH's Architect's Branch redeveloped Greenwich as an experimental hospital layout.



hospitals . . . it was absolutely essential that the nurse should be able to see and hear the patient, especially at night. If patients were going to be shut up in single rooms and small wards it would be necessary to consider how they should be monitored, perhaps even by means of closed circuit television.<sup>87</sup>

Another speaker agreed. 'The Nightingale ward gave what no other unit gave, and that was constant detailed observation.' Falls, and patients' peace of mind, were often cited as reasons why there had to be a clear sight line between nurse and patient. Speaker after speaker alluded to this issue, until one group secretary had the temerity to suggest that direct observation of the patient by the nurse might not be as important as it was made out to be. How much could the nurse in fact observe unless she was standing by the patient's head? And did patients, other than those who were acutely ill, really need to be under constant observation?' Perhaps emboldened, two other speakers agreed. The principal matron of United Birmingham Hospitals said that 'a nurse could stand at the bottom of a patient's bed and not realise he was dead'. A bacteriologist from Cambridge said 'he had never understood why it was so important that a patient should be *seen* to fall out of bed.' The majority of speakers, however, nursing and medical, remained wedded to the concept of constant observation.

Had the King's Fund Bed challenged entrenched views of this kind (for example by including a personal lavatory as did the US bed mentioned in Chapter Three, or cupboards), medical opinion might have been mobilised against it.<sup>88</sup> But the RCA's methods, rooted as they were in

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<sup>87</sup>'The Ward of the Future', British Hospital Journal and Social Service Review, December 31, 1965, pp2465-2467:2466.

<sup>88</sup>There are issues here to do with the relationship between medical and nursing practice which I have not explored. Clearly nursing practice cannot be reduced to medical dictat.

ergonomics and anthropometry, had produced an artefact particularly well suited to British ward practice in the mid-twentieth century, where patients were relatively powerless, passive, to be observed at all times, and positioned correctly; a problem certainly analogous in physical terms to that of Enoch Powell's '150 lb work load passing through a series of industrial processes'.<sup>89</sup> That the work materials should be in correct physical and visual alignment with the operator was a fundamental principle of ergonomics. What the King's Fund Bed most resembled was an adjustable work bench. This is perhaps the best explanation for the insistence on height adjustment, despite its expense, engineering problems and knock on effects on the rest of the bed's functions. Gillian Patterson recalled that, at a very early stage in the project, 'height adjustment drove the literature search'.<sup>90</sup> As the charge nurse of the ward where Nesbit-Evans bed was trialled remarked, 'For too long we have thought of the bed as a shelf on which we would rest our patients and carry on regardless.'<sup>91</sup> Moving patients the short distance from a shelf to a workbench was uncontentious in British hospital medicine of the period. As Alexander had commented in his rejection of design methods, the success of an artefact will depend on

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<sup>89</sup>The subject of positioning patients warrants further study. Nursing textbooks prior to around 1970 list large numbers of positions, often eponymously named, into which patients might have to be placed, with instructions on how the nurse should do this. Bed manufacturers attempted to cater for these. In many circumstances, such positions were mandatory; delivery, for example was to take place with the patient in either the left lateral or the dorsal position. Positioning becomes less prominent in nursing textbooks in the 1980's and 90's. Some positions, such as those for postural drainage, had gradually fallen into disuse because of new therapies, including antibiotics. But a more general cause would seem to be the adoption of a less interventive, and less ritualistic, approach to patient care: less washing and blanket bathing, fewer enemas and irrigations, less extensive 'prepping' for operations. And during the 1970s, procedures were increasingly carried out in a dedicated treatment room, rather than in the ward bed.

<sup>90</sup>Interview, Gillian Patterson, 14.9.98.

<sup>91</sup>Southwood, 'Nesbit-Evans King's Fund bedsteads in use', p.541

much subtler questions than those expressly addressed, 'most of which we do not know'. These subtler questions, about power and hospital practice, were not amenable to the objective and quantitative techniques of Design Methods, which largely served to obfuscate them, and also to perpetuate them. The Movement was, with its functionalist stress on reconciling conflicting 'needs', profoundly supportive of the status quo. Conflict was to be solved by changes in the artefact, not society. The issue of nurses' backs is a case in point here. The RCA team saw minimising back injuries as a user need to be fulfilled by proper design. The Royal College of Nursing maintained that staff shortages were to blame. The *Lancet*, while agreeing that the King's Fund Bed would help, thought better training of nurses was the overall answer.<sup>92</sup> From the mid-1970s legislation was gradually introduced to limit the loads that nurses would be expected to lift in hospitals.<sup>93</sup>

Further evidence that the success of the King's Fund Bed may have had to do with 'subtler questions', rather than the factors explicitly quantified and optimised in the method, is perhaps indicated by subsequent changes in some of those factors. It was a third criticism of Design Methods that they were 'inflexible', precisely because of the intended closeness of fit between design and user needs. User needs, it was pointed out, could and probably would change in a shorter time than the intended life of the design. It was unrealistic to painstakingly match design factors to a 'snapshot' of users and their needs taken at one

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<sup>92</sup>'The Nurse's Load', *Lancet* ii, August 28, 1965, pp.422-423:423.

<sup>93</sup>Hospitals were brought under the health and Safety at Work legislation in 1974, but could still claim crown immunity.

particular moment.<sup>94</sup>

The RCA team attempted to minimise this problem by anticipating future trends and their implications for the specification. They depended here on the opinions of other specialists, some of which proved incorrect. It was realised, for example, that the anthropometric data which was the basis for substantial parts of the specification was based on compilations from the existing literature 'for Anglo Saxons'. Aware, as they could not fail to be in Britain in the mid 1960's, that the proportion of immigrant nurses might increase, the team consulted A. H. Brodrick, an anthropologist at University College, London, 'to determine whether any time should be spent in considering other than "A-S" (AngloSaxon) populations' since 'Europeans, Negroes, S. Asians and Latins live and work here in considerable numbers.' Brodrick's views were recorded as follows: Although there is a well established stream of immigration, in particular of West Indians, it would be unsafe to predict that it might continue for very long . . . the reasons for this immigration are neither fixed nor enduring. Comparatively small changes in the economic, social and legislative balance between the UK and the rest of the world could stop or re-direct this movement overnight. He pointed out that considerable numbers of negroes stayed here only a short time either because of the very trying climate or because they had come for specific purposes, i.e. training or to earn a little capital. These factors would operate more or less for all the exotic races<sup>95</sup>

On the basis of Broderick's advice, no additional anthropometric data was sought. But in fact, by 1975, at the end of the period under consideration, over twenty percent of all student and pupil nurses in NHS hospitals came

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<sup>94</sup> Mitchell, *Redefining Designing*, p.

<sup>95</sup> AAD/1989/9, Job 7 'Anthropometrics, Doct 1532'.

from overseas, and of the 4,332 foreign nurses granted British work permits that year, the great majority came from the Caribbean, Mauritius and Malaysia.<sup>96</sup>

Future trends in 'nursing practice' which appeared to require catering for in the specification were listed among the 'critical factors' to be taken into account. Considerations under this heading largely came to focus largely on two potential trends in 1960's hospitals: the use of 'mobile bed systems', and the giving of anaesthetics in ward beds. In neither case, however, did the trend materialise to any extent, though the specification was designed to accommodate these potentially changed user needs.

Standard ward beds prior to the 1960's were often fitted with castors which were raised from the floor to immobilise the bed when not in use. These small diameter castors allowed for limited mobility in the ward, but such beds were inadequate for travel to other parts of the hospital with the patient in situ. Although a degree of mobility was clearly desirable, nothing like the full mobile bed system was ever adopted in Britain.

One implication of moving patients around the hospital in their beds would have been that they would still be in them when they were anaesthetized prior to being moved to the operating table. The question of whether anaesthetics would be administered in hospital beds concerned the team; anaesthetic gases in the presence of static electricity were an explosive hazard. As noted in Chapter One, there had already been several accidents in operating theatres. The MOH would demand equally stringent

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<sup>96</sup>Lesley Doyal, *The Political Economy of Health*, London, Pluto Press, 1979, p.206. By the mid 1960's, agency nurses, of whom an even larger proportion were from overseas, constituted the 'entire night staff' in some hospitals. In 1965, Hospital Secretaries agreed that agency nurses 'ought to be banned' but this might close 'one third to one half of all beds'. MH90/86, Sec BG 6/65.

precautions over the design of all ward equipment should anaesthetics be given in beds with any frequency. Although this trend, like the fully mobile bed system to which it was related, did not materialise, explosive gases did appear on the wards, by a different route. The central supply of oxygen, piped to outlets by patients' beds, became increasingly frequent during the 1960's. In this case, the specification was correct, but perhaps fortuitously.

The opposite situation, where possible attributes were deemed unnecessary because of future trends, also occurred. The RCA team were told that the problem of bedsores would largely disappear with the introduction of new antibiotics, so the incorporation of measures either to mitigate their formation, or assist with the frequent turning needed for immobile patients, was not pursued. (Turning was onerous for nurses and distressing for patients. Some nurse juries had suggested a facility for lateral tilt of the mattress platform would be beneficial.) In fact, bedsores remained a widespread and intransigent problem in hospital patients.

The 'user need' for some design factors incorporated in the bed diminished during subsequent years : foot high tilt, for example. The issue of tilt had occupied the team considerably. The decision to provide tilt at all levels of height adjustment, increased the engineering problems and the cost.<sup>97</sup> The solution of combining height and tilt mechanisms went some way towards reducing the cost but certainly not to below that of a height adjustable bed without the tilt function. And it was the range of tilt at high height that caused the most severe problems of stability for the bed, and necessitated its fairly 'massive' construction. But the team's conviction that tilt was necessary had existed since the early days of the project. It had

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<sup>97</sup> The very wide range of tilt stipulated in the first draft specification was later reduced somewhat.

been one of the most obvious user needs to identify (though not to quantify). Their nursing contacts had frequently told them how it was standard practice to raise the foot of a collapsed patient's bed as an emergency procedure. This was done by nurses heaving the bed end onto metal supports (known as bed elevators) or wooden blocks, or, failing all else, the seat of a chair. Clearly impressed by the physically inefficient and potentially injurious nature of this procedure, the team spent a great deal of time and effort on the matter.

From around 1970, however, emergency resuscitation procedures for the collapsed patient changed. Lesser degrees of head down tilt remained standard for patients with low blood pressure, post-operatively for example, but heroic levels of foot high tilt were abandoned. Intravenous fluids played a greater role in the treatment of circulatory collapse, and in cardiac arrest, external cardiac massage became standard practice. Resuscitation was the province of rapid response teams of junior doctors, rather than nurses. The primary requirement of the bed for this purpose was that it should provide a hard, flat surface beneath the patient, who otherwise had to be got onto the floor (or, if the event was anticipated, nursed with wooden boards under the mattress). Unlike older, sprung beds, King's Fund Beds did provide a hard flat surface, by virtue of the rigid and continuous mattress support. But the solid base had been an almost inevitable result of the restrictions imposed by the height adjustment mechanism, which necessitated the thinnest possible structure. Doreen Norton made the team aware of the new technique of cardiac massage but it was not one of their first-line justifications for the rigid base.

My point in citing the fallibility of expert predictions is this. Carefully documented user characteristics changed, practices which the bed was

specifically designed to facilitate fell into disuse, anticipated user needs failed to materialise, and yet still hospitals bought King's Fund Beds. In the light of these discrepancies the closeness of design fit to user needs (as defined in the project) seems a less than satisfactory explanation for continuing rising sales. I do not want to overstate the case here, but such discrepancies raise again the question of how much getting the 'right' answers to the questions posed in the method used to design King's Fund Beds contributed to their initial success, and how much this was attributable to contingent factors, related interests and shared assumptions about solutions, and also to what might be termed the Bed's 'image'.

Because if the success of a designed artefact could be affected by subtler issues which were not amenable to calculation and optimisation, some of these issues concerned how successfully or otherwise its protagonists negotiated the social world. An obvious example here is advertising. But the negotiation process can begin much earlier. From the time of Archer's involvement with the project, the issue of hospital beds took on a higher profile. He had perhaps learnt from the experience of the Nuffield year where much time was spent working on documentation largely in isolation from the sponsors. The working arrangements with the King's Fund were in any case much closer and friendlier, involving many informal meetings. At the Nuffield, the sponsors were largely the medical elite, and remote. At the King's Fund there was regular informal contact with Irfon Roberts, the Committee Secretary, who was soon enrolled firmly behind the project and convinced by Archer's methods. (He subsequently promoted them in articles on equipment in the hospital press.) Roberts was instrumental in persuading the Fund to continue beyond the original end-point of the project, which had been the production of the specification.



The Committee itself was largely of laypeople without a strong medical presence. Russell Grant, its only medical member, was a physical medicine consultant concerned with developing his own design of hospital bed. This was with the express purpose of allowing patients (especially in long-stay institutions) to adjust it for themselves, a very different artefact from that described in the RCA specification. It is clear that as momentum gathered with the RCA's work, the influence of the Working Party on the content diminished. But Roberts and the Fund's publicity resources ensured plentiful coverage, and throughout the project, Archer had been mindful of its presentation.<sup>98</sup> Formal reports were produced on every aspect of the research, and no opportunity lost to stress the amount carried out (always in terms of units). Research was a powerful commodity, as the newly formed Consumer's Association pointed out in a slightly different context. In the face of:

. . . the power of capital, the knowledge of research and the influence of advertising . . . the consumer was isolated, weak and ignorant. By fortifying him with the research . . . (the Association) would help to bring the whole shebang into a better state of equilibrium'.<sup>99</sup>

Research strengthened knowledge claims. Both Archer and Agnew later stated that this had been one reason for doing both the amount and type of research carried out. 'We needed to be able to face potentially hostile politicians or pathologists with firm evidence', said Archer, and Agnew wrote that:

The . . . bed project I think involved a number of experiments with ranking and scoring simply because we had to demonstrate the conclusions

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<sup>98</sup> Journalists at the time of the publication of the specification were offered 'background stories for the bed of how nurses break their backs at old-fashioned fixed height beds, and patients break their legs. Archer to Wainwright, 2.3.67, AAD/1989/9, Job 13.

<sup>99</sup> Jonathan Woodham, 'The Post War Consumer' in N. Hamilton (ed), *From Spitfire to Microchip*, pp.6-11:7

were not subjective. It was the primary reason for employing us.<sup>100</sup>

And, as Archer later recalled, reflecting on the success of the project, 'we talked to a lot of people'. These people had included the Ministry and the industry, the real determinants of supply and demand. The help proffered by individuals in these groups had included advice on negotiating the social world. 'You must make it more embarrassing for the MOH to stand up and say there is no money for these (King's Fund) beds than to make extra provision for them', Hunt told the team; useful advice indeed from the Controller of Supplies.<sup>101</sup> 'Networking' (a term most appropriately derived from the cyborg sciences) was important.

A passing comparison could be made here with another medical artefact for which a standard specification was produced in the 1960's. This was the Medresco hearing aid, designed by the Medical Research Council, with a sole contract for its production awarded to The Post Office. The device was widely regarded as a failure. It had a very low uptake, and the sole contract with the Post Office was considered 'to have destroyed the British hearing aid industry'.<sup>102</sup> Though there are clearly many factors to be considered here, the level of advocacy for the new device by its designers and manufacturers, respectively MRC scientists and Post Office officials, may not have been high.

Another comparison is possible, and that is with how the King's Fund Bed fared in circumstances where the benefits of 'networking' were largely absent or greatly reduced. This was in the overseas context. The

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<sup>100</sup>Personal communication.

<sup>101</sup>Interview, Gillian Patterson, 29.1.98.

<sup>102</sup>Office of Health Economics, *Hospital Purchasing*, London, 1972, p.26.

bed did not, on the whole, sell well abroad. Hopes that it would prove an exception to Britain's poor export performance did not materialise. In 1966, British imports of medical equipment totalled some £60 million, whereas exports were only around £8.5million.<sup>103</sup> At a major international trade fair for such equipment in the Netherlands in 1967, 'barely half a dozen' out of 170 exhibitors were 'of British origin or direct association'.<sup>104</sup> Despite Britain's repeated applications to join the EEU during the 1960's, medical equipment firms still looked, if they looked abroad at all, to dwindling traditional markets in former dominions and colonies.<sup>105</sup> The pattern could be detected within Nesbit-Evans, with older, family member Directors pursuing markets in Nigeria, South Africa and Jamaica.<sup>106</sup> In some cases this had a direct effect on companies' methods of construction, since some techniques were considered too sophisticated for manufacture under licence in such countries.<sup>107</sup> Largely through the efforts of others, such as Weston, and the RCA, who were careful to pass on any foreign interest in

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<sup>103</sup> A. Rowe et al., 'The Bath Institute of Medical Engineering', *British Journal of Hospital Medicine*, Equipment supplement, April 1970, pp.29-31:29.

<sup>104</sup> 'Medica '67, Utrecht', *Hospital Management*, November 1967, pp526-528.

<sup>105</sup> The Crown Agents, the government purchasing authority originally set up for the colonies, had traditionally ordered large numbers of very basic British Standard beds, unlike British hospitals, where 'nobody ever bought them'. Interview, Kenneth Crisp, 20.7.00.

<sup>106</sup> Dermot Nesbit-Evans had a working scale model of the King's Fund Bed made in which the foot pedal could be operated with a finger tip to demonstrate to potential buyers abroad. Interview, Toby Weston, x.11.98. In 19.. he was pressing for urgent attention to the hydraulics of the beds so they would function in tropical climates. 'The Medical Officer of Health for Jamaica may go "off the boil" if we do not make his bed work satisfactorily very quickly. Dermot Nesbit-Evans to Kenneth Agnew, 1.11.67, AAD/1989/9 Job 15.

<sup>107</sup> Dermot Nesbit-Evans resisted closure of their foundries and a change to all-welded construction since he considered 'sales in underdeveloped countries should be based on cast corner beds.' Toby Weston to Kenneth Agnew, 30.4.70, AAD/1989/9 Job 15.

the bed to him, newer markets were pursued and manufacturing rights sold in some countries, including Holland and Yugoslavia.<sup>108</sup> An Australian company bought rights, but never made the bed, so did an Italian manufacturer, who had little success, the bed being 'too sophisticated' for that country's market.<sup>109</sup> The 'closeness of fit' of some of the explicitly considered factors in the method to the British hospital situation was partly responsible. It was standard practice in some European countries, for example, to autoclave the entire bed each time a patient was discharged. Stainless steel was the only finish which would stand up to this treatment; the powder coated steel specified for King's Fund Beds would not.<sup>110</sup> But clearly, expectations, norms and assumptions played a central role. Sometimes these were related to the economics of health care, and sometimes not. A US bed manufacturer was initially interested in the beds. 'This interest came about, of course', he told the RCA, because of our new Medicare program in this country'.<sup>111</sup> Medicare patients could not expect the electrically powered beds enjoyed by private North American patients, and the King's Fund Bed might have been a good compromise. But the situation in other countries bore no direct relation to the economics of their health care. In Denmark, beds were almost universally of fixed height, and built to a national standard. 'Nobody seemed to have the slightest difficulty with this'.<sup>112</sup> In Switzerland in 1964, a lifting back rest (that is the rising

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<sup>108</sup> Report of a meeting at Nesbit-Evans Factory, 12.10.73, AAD/1989/9, Job 15.

<sup>109</sup> 'Roger', Milan, to Kenneth Agnew, 13.5.70, AAD/1989/9 Job 15.

<sup>110</sup> Interview, Kenneth Crisp, 20.7.00.

<sup>111</sup> AAD/1989/9, Job 13. Weke to Archer, 8.11.66.

<sup>112</sup> AAD/1989/9, Job 7, 'Tour of Scandinavian hospitals'. Denmark spent slightly more on hospital care per person than England and Wales in the mid-1950's (as a proportion of average income per head). Office of Health Economics, *Hospital Costs in Perspective*,

base in the RCA prototype as an alternative to the pull out back rest, abandoned in Nesbit-Evans first versions) was 'thought most essential and all hospitals . . . had hydraulically operated backrests which could be used by nurse or patient.'<sup>113</sup> National standards themselves varied widely. In France the national standard specified the height for a fixed height bed as 16" (40cm), compared to the British 24" (61cm).<sup>114</sup> A study as long as this one would probably be required to elucidate the factors beyond those explicitly considered in the RCA's method which determined hospital bed types in each of these countries.<sup>115</sup> But certainly protagonists for the King's Fund Bed did not have abroad the links with powerful interests that had been constructed at home.

A minor episode occurred in the year after the specification was published and King's Fund Beds went on the market which adds a small postscript to the question of the success of the King's Fund Bed. In late 1968 the RCA's prototype Bed was considered for a prestigious Council of Industrial Design award the following year.<sup>116</sup> It was the first time that the scope of this annual competition had been widened to include capital goods, a probable result of leadership changes within the Council. The Secretary since 1946, 'an ex-Wrens officer of great charm' retired at the

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London, 1963.

<sup>113</sup> AAD/1989/9 Job 7 'Tour of Swiss Hospitals', Evered and Co. March, 1964.

<sup>114</sup> John Gainsborough, 'Current Trends in Hospital Design in London and Paris', *British Hospital and Social Service Journal*, June 7, 1963, pp.664-667.

<sup>115</sup> There are instances of very direct technology transfers into medicine from prominent national industries. Swedish hospitals, for example, adopted the 'boil in the bag' vacuum packed meal system originally developed for miners in the north of the country.

<sup>116</sup> Report of a meeting at the COID, 20.12.68, AAD/1989/9, Job 15.

beginning of the 1960's <sup>117</sup>She was replaced by Michael Farr, a long-standing associate of Archer's and a professional designer with a high profile in industry. It was probably this connection which furthered consideration of the bed for an award (and also the sympathetic interest of the COID throughout the project). A bed was duly delivered to the Design Centre and examined by the judges who, although they 'were leaning over backwards to try to justify giving it an award', couldn't bring themselves to do so, largely on aesthetic grounds.<sup>118</sup> Despite, presumably, Farr's goodwill, and the powerful rhetoric of satisfied user needs, the bed did not fit with the notion of 'good design' at the COID; a concept that had proved almost indefinable, though much discussed, in the essentially conservative circles there.

## Conclusion

The above episode illustrates the fact that it was not only in the esoteric world of medicine that success depended on other than the computable. It also serves to underline just how accommodating has been the concept of user or consumer need, and how fine the line is between serving needs and serving interests, if indeed the line exists at all, except in semantics. Needs are supposedly 'basic', essential, justified and, especially if they can be defined biologically, relatively unassailable. Interests are partisan, and contestable. Needs belong in the natural world, interests in the social. In fact needs are no less contestable than interests. Who shall be allowed

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<sup>117</sup>Plummer, 'Fitness for Purpose'. pp.8-9.

<sup>118</sup>John Blake to Toby Weston, 11.2.69, AAD/1989/9 Job 15.

needs, how needs will be defined, and what constitutes proper satisfaction of need, is all contestable.

The identification of user needs in the King's Fund Bed Project, and perhaps more generally, may be seen in large part as a legitimization of interests, an obfuscation whereby the interests of powerful factions were translated into the 'needs' (largely biologically defined therefore particularly unassailable) of less powerful (but useful) users. (This is not to suggest by any means that protagonists for the bed consciously intended this to be so.)

Many of those involved with the Hochschule fur Gestaltung at Ulm in the 1960's were alive to the political dimensions of design, and preoccupied with the role of design in a consumer society and they continued to debate these issues in a way that was, until relatively recently, largely absent from the studiously apolitical North American and British tradition of writing about design. Horst Rittel, for example, discussing user needs, suggested that one approach for the designer was to 'confess that he was a politician and that this in itself was not disgusting'. In 1964 he had characterised Archer's method as one which concerned itself with the organisation of the decision space. It used 'simple methods of organisation . . . very primitive methods but these are useful for better organization of data, for a disciplined and effective approach . . .'<sup>119</sup> But Rittel later came to reject such methods. The first generation model works like this: you work with your client to understand the problem, then you withdraw and work out the solution; then you come back to your client and offer it to him . . . at every step in developing such a solution you have made deontic or ought-to-be judgements that he may or may not share but that he cannot read from the finished product offered in your solution.<sup>120</sup>

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<sup>119</sup>Rittel, *The Universe of Design*, p.86.

<sup>120</sup>Quoted in Cross, *Developments in Design Methodology*, p.322.

The clients for the King's Fund Bed couldn't read them either, but it didn't matter. The design solution was perfectly attuned to shared assumptions about patients, nurses, and management in the NHS. It was not until these assumptions changed that some of the 'deontic or ought-to-be' judgements became visible. In the 1990's the talk was of consumers, not patients, and this term is now commonly used in official and research publications on the Health Service. Economic relations have not changed, British health care is still paid for through taxation and free at the point of use, so presumably the changed language is intended to convey an alteration in attitude.

In line with this trend, King's Fund publications also talk of consumers, not users, or patients. This terminology was employed in 1998, when the Fund revisited the specification for the King's Fund Bed. A steering group re-examined this 'one off study that had remained influential for years'.<sup>121</sup>

Talk was now of occupants, informal carers and staff, in that order, and of 'stakeholders' generally. The key areas were occupant independence, pressure sores and back injury, again in that order. It was recommended that a 'forum for continuing partnership' should be set up. The study encompassed beds for nursing homes and occupant's own homes, as well as hospitals; the 'district general' has been replaced by 'care in the community' as a central focus in health care delivery. The conclusions of this subsequent study of hospital beds highlight the way in which successful design solutions depend on the successful embodiment of prevailing assumptions and the powerful interests which maintain them.

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<sup>121</sup> Mitchell et al., *Better Beds for Health Care*, p.1998.



I will conclude with two quotes. Jean Baudrillard, in line with a now orthodox post-modern view, opined that  
 'The empirical object . . . the object is *nothing*. It is nothing but the different types of relations and significations that converge, contradict themselves, and twist around it, as such - the hidden logic that not only arranges this bundle of relations, but directs the manifest discourse that overlays and occludes it.'<sup>122</sup>

It is largely this view, that the object is the manifestation of a 'hidden logic', that has been propounded in this thesis. The German Romanticist, Novalis, two centuries earlier, wrote that 'everywhere we seek the unconditional, and all we ever find is things.'<sup>123</sup> While well aware of the anachronism of plucking sound bites out of the past and using them out of their original context, it might perhaps be permissible to assert that it is in the contingent nature of 'things' that their value to the historian lies.

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<sup>122</sup> Jean Baudrillard, *For a Critique of the Political Economy of the Sign*, St Louis: Telos Press, 1981, p.63.

<sup>123</sup> Novalis, quoted in Erlhoff, 'Ulm as a Model of Modernity', p.54. Novalis was the pseudonym of Friedrich von Hardenberg, German Romanticist poet and polymath, 1772-1801.